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EXTRACTION OF PLANT ALKALOIDS AND CHEMICALS FROM MEDICINAL PLANTS THROUGH VARIOUS METHODS

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ABSTRACT

Medicinal plants are very important since pre-historic times. The value of medicinal plants and their obtained drugs is very important and several chemicals can be obtained from plant parts like a leaf, stems, bark, and root, etc. Some chemicals are very important like linolenic acid, vincristine, linoleic acid, etc. The properties and its potent products are very highly vulnerable, powerful, and efficient effective & cardio tonic. The drugs obtained from medicinal plants are very effective against human diseases and other several neural disorders. They are the chief source of medicinal drugs which can prevent neuromuscular, sclerosis, antioxidants, and several other infective fungal diseases. Several techniques like chemical extraction, southern blotting, solvent extraction methods are very useful for the isolation of these compounds.

KEYWORDS: Highly Vulnerable, Extaction Methods, Neural Disorder, Cardio tonic, Antioxidant & Potent Products

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INTRODUCTION

The medicinal plants are the bone of Indian history. Several medicinal plants are used to produce medicinal drugs and alkaloids. The properties of drugs are varying because their extraction, chemical structure and properties are different from each other. In ancient times, several techniques were applied for the extraction of these chemical compounds (Electrophoresis, 2009). Generally, they are made up of long-chain terpenoids and unsaturated hydrocarbons. Based on their taste and antioxidant properties(Yubin et al., 2014), they are categorized into different classes. Different types of techniques are beneficial for the extraction of these alkaloids. Today, several advanced technologies have been developed for extraction for these compounds like chemical extraction methods, solvent extraction methods, solvent-solute extraction methods, ninhydrin methods, halides, halogen extraction methods(Luís et al., 2016), and different other methods have been applied on the basis of its structure and its polarity basis. The new advanced methods like southern blotting, northern blotting, gel electrophoresis methods(Electrophoresis, 2009) are well established and frequently applied for the extraction of these chemical compounds. The nature of these compounds and their structure existence in different forms and show that different polarity into different solvents like methanol, acetone, ether, alcohol, and other acidic and some basic compounds are recommended for the isolation of these drugs. The natural drugs are very potent inhibitors of several diseases like human chronic diseases, colds, flu, kidney stone, gall stone, haemorrhage, and anti-inflammatory disorders(Vilhena et al., 2015). Some chemicals show high polarity so they can easily dissolve with these alkaloids and form precipitate formation that takes place into the organic solvents. The potency of these compounds is different because they will show different covalent interactions, hydrogen bonding, anhydrous bond in polar as well as nonpolar solvents. Accordingly, the concentration of these chemicals will form different bonds within different

compounds(Yadav et al., 2017). The extraction methods like chemical extraction are very effective and easily performed and show that easily generate the product(Yubin et al., 2014). For testing of these compounds, we have used mainly alcohol, ether, and other chemicals and easily identified their polarity and cation bases(Luís et al., 2016). Several scientists have developed different techniques for the isolation of alkaloids from drug obtaining plants. However, the oldest methods and techniques are well established for industrial purposes and enhance the productivity of these drugs.(Anderson et al., 2013)

MATERIALS

There are some medicinal plants that are very rare and which are not possible to cultivate on a large scale. This could be a very important reason behind this if we do commercial production of these on large scale then their quality may decline and that's why their commercial production is very slow.According to Indian farmers, they do not want to cultivate it on a large scale because they do not understand its uses so much. Therefore, due to less knowledge of agro-technology, they are unable to produce these plants. Different techniques are used to save the quality of these plants and to separate the chemicals present in them, chemicals can be obtained from different parts of the plants like the flower, stem, bark, branch, root, etc. Some of these important techniques are described here, by which we can separate the utility of the plant and the chemicals present in it.

METHODS

Medicinal plants are the source of different ingredients like alkaloids, dyes, drugs, medicines, etc. All these sources are found in different parts of plants like roots, bark, leaf, stem, etc. Various techniques have been used to extract them from different parts of the plant, such as physical method, chemical method, other methods, etc.

Extraction of Phenolic Compounds using Solvent Methods

Scientists have done work on this technique and to know this effect, a variety of chemicals and solvents such as methanol, ethyl alcohol are used for this, the main use of which is to separate antioxidants from different parts of the plant such as leaves and seeds. The chemicals and solvents used in it have different properties and different accuracy, which are very high degrees of saturation at different polarities (Sign Chee Tan and Below Chin Yiap. Nov.2009).

Different types of chemicals are made up of different functional nitrogenous and amide groups acids. The polarity of these elements is varying according to the concentration of salts and the nature of solvents. They exist either polar or may either nonpolar. Water is a polar solvent because it can be easily solubilized all types of elements. plants alkaloids are made up of different constituents like nitrogenous, amines, phenols, alkyl halides, etc (Antony, R. and Thomas, R.2011). They are different in nature so extraction of these alkaloids and derivative compounds of the extraction process is different on the basis of solubility. Ethanol is less reactive as compared with methanol. The reactivity and solubility of methanol are highly and exist in easily polar solvents.

Organic Solvent cum Liquid Extraction Method

Medicinal plants are an important source of herbal drugs which can be obtained from different dried parts. The plant's parts leaves, bark, stem, roots are the chief sources of these drugs. Here are firstly plant parts are dried after then some chemicals are mixed with this dry parts and make a solution. The nature of the solution depends upon the polarity of solvents like benzene, water, ether, alcohol, and other derivates of nitrogenous compounds (D.T.Gjerse, L.Hoang, and D. Hornby.2009).

the dried powder of plants is shaking vigorously, it contains different alkaloids compounds like nicotine, fats, alkyl halides, nitrogenous alkaloids, etc (J. Sambrook and D. Russel.2001). Different types of the mixture will be mixed with different components solution and perform different reactivity some chemicals like caustic soda, sodium carbonate distilled with solutions dry matter because the polarities of solution and solvents are specific. Some compounds are derived from strong alkylating agents and in between hydrogen bonding, covalent bonding is very strong, so they are not easily dissociated (J.D Watson, T.A Baker, S.P bell. in 2004). They take time for proper dissociation and perform different types of precipitates at a time of intervals. Some are easily dissociated as compared to alkyl halides are strong bonding here Cl and COOH bonding is strong. The polar group of compounds shows that electronegativity and it will react to another compound (S. V. Smarason and A. V. Smith, Oct. 2003). The bonding of the carboxylic group is very strong as compares to water molecules bonding. so here different solutions will apply for the extraction of different alkaloids. Some are separated on the basis of solubility and others are separated on the basis of reactivity (P.Chomczynski and N.Sachi. 2006).

Acis and Base Cation Exchange Methods

The medicinal plants are the chief source of drugs and are partially extracted from a different mode of way (J. D. Watson, T. A. Baker, S. P. Bell, A. Gann, M. Levine, and R. Losick. 2004). The plant contains different derivative drugs containing charge derivates like negatively or maybe positively charge, on the basis of mass and charge centrifugation methods, we will first prepare an aqueous solution in which we have applied another solvent that can easily dissociate from all benzene and nitrogenous containing groups which are performed negatively charged, the carboxylic group basically negatively charges so, it is easily identified (G. Brooks. Dec.2002) that carboxylic containing groups react with positively charged groups, and nitrogenous containing groups if donates electrons from other groups of compounds and they are performing high reactivity, some are electrophilic anions so they will react to be any other compounds (L. J. Cseke, P. B. Kaufman, G. K. Podila, and C.-J. Tsai, Dec. 2004). When we have applied a charge solution and started the shaking, the organic compounds start to perform the reactions. The heavy mass charge particles will react slowly, so they are less reactively as compared to lightweight compounds of charged particles, which react easily to another base analogous agents. On the basis of reaction, we have easily distinguished which compounds are terpenes (L. Buckingham and M. L. Flaws, 2007)and which compounds are nitrogenous fewer derivates. The reactivity shows that the precipitate of a compound always depends upon the size of the compounds and their mass. The light compounds are easily performed precipitates and after some time they easily disappear & highly mass weight compounds are unstable, so they are formless precipitates and do not easily disappear. This is a very effective technique and very useful for the extraction of unknown heavy mass compounds.

Chromatography

Chromatography is a technique applied for the separation of molecule's heavyweight compounds on the basis of charges (K.-H. Esser, W. H. Marx, and T. Lisowsky, 2006). the interaction between charged molecules and ligands will show that heavy molecular weight compounds are always separated after low molecules weight compounds. the heavy molecular weight compounds are terpenes, proteins, alcoholic compounds, and nitrogenous compounds (M. C. Little, Dec. 1991). The ligands are negatively charged groups and heavy or lightweight compounds are positively charge groups, in this process, we have used a paper in which two solutions are applied when high molecular compound solvents are applied on paper in a series of manners, after that, we have put this paper into a solution, this solution act as an absorbent which helps in movements of compounds on the basis on density gradient centrifugation (R. D. Nargessi, Feb. 2005). After that it will

apply to the dryer when Solent moves in solution then it will move with towards away with the upper side (Bio-Nobile Oy, 20030). First, low molecular compounds will separate after heavy compounds, layers of separation are observed (BIOMOL GmbH, 2004). It's a very beneficial technique & here are two phases one is the stationary phase and the other is the mobile movement phase (D. B. Selingson and E. J. Shrawder, June 1990). On the basis of chromatography separation of solutions, it will be different types: Thin-layer chromatography (TLC), Ion exchange chromatography, Gas-Solid Chromatography, column chromatography, affinity chromatography, High-performance liquid chromatography, Gas chromatography, etc.

Column Chromatography

Steady phase in column chromatography filled in a glass tube or metal tube. and this tube the moving phase is run, this tube is 20 to 30 cm in diameter, in this tube 50 to 100 gm absorbent comes in it, which can prevent many absorbates(Tan & Yiap, 2009) to provide support to absorbent we have used wool or glass wool in the tube, samples were inserted in this tube with high velocity, one phase is a mobile phase which is continuously moving with high speed and another phase is a steady phase so it will stay and moves slowly (compounds are present in a sample and they will move at different velocities depends upon the molecular mass and density, volume (Niu et al., 2018). These elements are different colors (Vilhena et al., 2015). It is clearly visible in the tubes and continuously moves outside and finally are molecular compounds are separated based on density.

Ion Exchange Chromatography

It works almost all types of ios including proteins, terpenes, small nucleotides, amino acids, larger molecular compounds, and light molecules weight compounds (S. M. Wheelwright, USA, 1991). however, ions exchange chromatography work must be done in that where are one unit away from the isoelectric points of proteins. Here are two types of exchange chromatography are mentioned here – one is ions exchange and another is cations exchange (S. M. Wheelwright, 1991). We have used cation exchange chromatography when the molecules of interest are positively charged because the pH of chromatography is less than the pH ((Niu et al., 2018). In this chromatography is stationary phase is negatively charged and it will attract to be positively charged molecules which are lightweight compounds ((Ghosh, 2020). While cation exchange chromatography stationary phase is positively charged and molecules are negatively charged(Niu et al., 2018), the molecules show that covalent bonding between the negatively or maybe show that electrostatic interactions between in them. the heavy and low-weight compounds are easily separated through this technique (Kushnirov, 2000).

Centrifugation

In this technique, we have used large mass weight compounds of charged molecules on the basis of charge centrifugation methods accordingly to density basis (Bleakley & Hayes, 2017). Firstly plant materials are converted into the dry powder form after then is mixed with different types of chemicals like acetone, ether, ethanol to change compounds forms. When we have applied acetone it will act as a buffer solution after that different types of enzymes are added, now we have applied the density gradient centrifugation method it will shake and rotate at 360 degrees of angle and shaking for 1-2 hours vigorously (Ghosh, 2020). When we have started be shaking proteins then they will be separated because enzymes take action upon them and break down molecules of interaction that are present between bonds that are properly not segregated (Vilhena et al., 2015), and finally, they are broken (Niu et al., 2018). finally, two types of layers are formed between the solution upper layer is slightly different from the lower layer because in the upper layer in low weight

molecules compounds and in lower layer high weight compounds like terpenes, carbohydrates, cellulose, and other polysaccharides, other high weight compounds (Vilhena et al., 2015). Finally, we separated one thing is more that is in the pellet last material that has deposited on the bottom side will be discarded, in this technique we have used a micropipette of different sizes accordingly to your materials. The range will be set on micropipette to take the materials is different (Pandey S; Shukla A; Pandey S; Pandey A, 2017). The chemicals used in this process like acetone, ether is helpful in maintaining the pH of buffer solution enzymes like cellulase, alpha-amylase, lipase, dextrose, nuclease, and different types of enzymes are used for different types of compounds separation and break down of bonding in between molecules.

Gel Electrophoresis

It is the technique of separation of low or high molecular weight compounds on the basis of charge separation applied through the electric field. The charge molecules start to be moved away from one pole to another pole applied after electric charge(Vilhena et al., 2015). Here are one pole is the cathode and another pole is the anode. Firstly you have prepared your solution in which different weights of proteins and compounds are present after that here we have added a specific dye that helps in the detection of compounds(Yadav et al., 2017). The dye is bromophenol blue, ethidium bromide, or methylene blue. The dye is provided color to be your solution after that properly shake it, then after we have prepared another solution is solvent, the pH of your solution should be maintained and in between 5-6.7 rages them (Tan & Yiap, 2009).After that, we have used a nitrocellulose membrane paper and the solution is gently applied to the electric glass substratum, for maintaining proper base we have to add your solution of buffer in it after that put nitrocellulose membrane in it. The two poles which are present on the corner side, the black one is the cathode and the red one is the anode(Kushnirov, 2000). We have put your compound mixture solution in it, after that, we have applied electric field, add your agar media of gel is take into this solution before add gel you must be identified that is your agar gel is solidified or not. It will take some time for proper solidification of gel. When the gel is solid applied on substratum then add your mixture after that add buffer solution from the left side of the corner and one side of the water is added finally both two wires are connected with electricity and on it. When current is moving across the electric field it will start to be move from lower to upper side, it will combine nitrocellulose membrane and start to migrate the solvent because the membrane acts as absorbent so it will move to charge molecules with solution from the upper side when solution particles move in membrane here compounds of molecules adhere with it and finally you proteins moves from one pole to another(Vilhena et al., 2015). During this process, positively charged particles attracted negatively charged particles, the reason is electrostatic force. During when solutions will move upon the membrane, different types of bands are appear in agar gel these bands are the sign of different masses if proteins after that visualize it and observe, low molecular weight compounds are firstly moved so bands are lightly heavy molecules of weight compounds are slowly moves, so bands are darker and below. Gel electrophoresis are different types depending upon the separation of charge mass compounds on the basis of bands and centrifugation forces like to dimension gel electrophoresis, poly acryl amide gel electrophoresis, agarose gel electrophoresis, starch gel electrophoresis, continuous – discontinuous gel electrophoresis, etc(Westermeier, 2005).

Centrifugation Method

In this method, we have applied centrifugal force for the separation of crude proteins from different resources in dry forms. The solution is firstly prepared and it is a mixture of different organic substances like nitrogen derivates compounds, carbon-containing compounds proteins, amino acids, liquid proteins, other compounds, etc (Cilia et al., 2009). Firstly we have to take plant parts tissue of meristematic like leaf, root, stem, other parts, etc. The tissue or plant parts are firstly

crushed and add one-two drops of acetone in-between time of intervals (Bleakley & Hayes, 2017). The leaf is crushed completely in a vortex cylinder, then we have extracted a crude liquid from this crushed material. After that, this mixture with adding other chemicals in which some different types of enzymes are present, the activity of enzymes mainly helps in the degradation of the cell wall of the plant (Luís et al., 2016) and help in the breakdown of bond formation in the component on the cell wall. Several different types of enzymes like lignocellulose, alpha-amylase, ligase, nuclease, etc (Niu et al., 2018). Then we have added a buffer solution for maintaining its saturation and pH at approximately between 5-6.0. the buffer is provided its basicity and acidity to the medium. It helps in maintaining the relative stability of the medium (Electrophoresis, 2009). Secondly, it provides proteins charge and without charge, proteins can not easily move and are separated from each other. It will provide base and acid and create a charge upon anions and cations in the medium. After sometimes we have started to be rotation at 3000-5000rpm for one to 5-10 min (Tolosa et al., 2007). When we have to shake it then the rotatory motor instrument we have used. Finally, two layers of proteins are formed one is crude, and the second is liquid slightly after that we have separated it and measure its proteins in a spectrophotometer at different ranges the graph will show the different ranges of proteins for different masses of proteins. After then we discarded the pellet and measure different ranges of proteins wavelength (Ghosh, 2020).

RESULTS

The medicinal plant's crude extract is used in all types of proteins it contains different types of amino acids, high molecular compounds, polysaccharides, terpenes, alkaloids, chemicals containing amino acid derivates, nitrogen derivates. Medicinal plants are the chief source of the economy. Plants alkaloids extraction techniques are valuable and they will separate all types of abundant proteins, polysaccharides at different levels. The plants are the main source of foods and timbers, it contains occurs in several alkaloids like morphine, codeine, berberine, quinone, vinblastine lobeline, vincristine,colchicine, sanguinarine, etc. These several types of drugs are important for the pharmaceutical industry. The future generation almost depends upon plant sources, several plants provides to be fuels, timbers, etc. Our economy and peoples background belongs to the villages if we have to conserve these plants sources and its valuable property then we have easily developed our socioeconomic status. Farmers must be aware of this knowledge. We have provided different programs and workshops related to plant biodiversity-related resources and manage them at different levels in academic institutions and different villages level.

DISCUSSIONS

Plant biodiversity is a conservation diversity of mega species. several types of pharmaceutical products and alkaloids and chemicals are very important for the future generation. the extraction of different types of proteins from medicinal plants obtained from different parts. industries can apply several types of techniques like protein separation methods, DNA extraction methods, southern blotting techniques for proteins separations like gel electrophoresis, column chromatography can be easily identified the nature of drugs and manufacturing alkaloid products. The techniques are based upon advance highly cheap and beneficial for unknown identified sequences of proteins. The herbal products are important for today's generations because our body immunity only depends upon synthetic chemicals but initiate immunity has been finished, the immune system ability of recognition antibody suppressed. According to Vedic sciences, the medicinal obtained drugs are extracted from ancient times but now today times it starting to form endangered points. the advanced genetic engineering technology will very help full for extraction of medicinal crude from plants. The Indian medicinal association always permitted herbal medicines because they are lee toxic to human health and beneficial for the immune system and its

nit side effects. so, the generation of new medicines is moving from Vedic ancient times and peoples are essentially aware of its knowledge.

CONCLUSIONS

The medicinal plant biodiversity is a living part of an ecosystem. it will cover several types of requirements of humans and animals like food, shelter, and other essentials medicinal requirements. the pharma industry's requirements materials like resin, gums, latex, alkaloids, chemicals, dyes and several other products can be obtained from the medicinal plants. The societies and countries can participate in the conservation of these plant properties at different levels. The world population's daily requirements and farmer's economy enhance through the conservation of medicinal plant diversity. If nature is co-existed then humans will not be sustained at a trophic level in the food chain. The consumptions of requirements must be retained at a specific level. We have avoided the destruction of medicinal plants and start to be safe. If we are doing any programs at any level then plants conservation awareness program always be applied. The response of villages and cities at different levels for conservation privilege sites. Some local authorities and government projects funds invest every year for the conservation of this biodiversity. At a local level, we have generated some projects and implementation for planting the medicinal diversity. In this paper, we have simply mentioned all techniques and valuable things of medicinal plants.

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